

# The LS-55 and LS-45 Fluorescence Spectrometers



Extraordinary applications capability,

**maximum performance**

# Simply Versatile: The LS-55 and LS-45

## Fluorescence Spectrometers

### Always the right choice

The PerkinElmer LS-55 and LS-45 Fluorescence Spectrometers provide your laboratory with the ultimate blend of high performance, reliability, ease-of-use, durability, and versatility. The LS-55 and LS-45 are the right choice to meet your laboratory's current and future applications needs. Indispensable features of these instruments include:

**Ultimate flexibility.** No instruments handle a wider range of bioscience applications than the LS-55 and LS-45. These instruments are ideally suited for bioresearch including cell-biology, immunology, enzymology, protein analysis, and microplate-based measurements.

**Broad range of accessories.** The wide range of accessories specifically designed for the LS-55 and LS-45 is versatile enough to handle virtually any type of sample.

**Reliable optical performance.** The LS-55 features continuously variable slits, in increments of 0.1 nm, for ultimate control of measurement conditions. The holographic gratings of the LS-55 minimize stray light for the highest sensitivity, accuracy and reproducibility. The LS-45 has fixed slits, for sturdy, dependable daily use.

**Durable, long-lived light source.** Unlike conventional light sources, the Pulsed Xenon lamp minimizes photobleaching of samples. This preserves the integrity of the sample and delivers accurate and uncompromised results.

### The Pulsed Xenon lamp: A stroke of brilliance

Preserving the integrity of your samples is crucial to the success of your experiments. PerkinElmer uses a high-energy Pulsed Xenon source for the LS-55 and LS-45. Pulsed Xenon offers these advantages:

- Minimal photobleaching of samples
- Long-lived excitation for stability and accuracy
- Improved low-light detection capability relative to other light sources
- Wide UV output (to 200 nm), for greater flexibility when selecting excitation wavelengths
- Replaceable pre-aligned bulb (no need to replace the entire lamp module)
- Delay and gate time can be varied to measure phosphorescence
- The ability to be turned off, for measuring chemiluminescence and bioluminescence
- Used by thousands of researchers for thousands of applications around the world

**User-friendly software.** Unique to PerkinElmer, FL WinLab™ software is a comprehensive package that provides the most powerful and flexible system for data collection and analysis. Built-in validation protocols assure you that the instrument is working properly.

**Versatility.** Multiple accessory options allow you to configure exactly the system you need, whatever your lab's specific needs. Purchase only the accessories you need now and add more accessories as your applications expand.

### LS-55: Scanning and plate reading – in one system

The plate-reader accessory lets you switch from a fully functional fluorescence spectrometer to a well-plate reader in seconds. The plate reader is mounted on the front, providing easy access to standard multi-well plates.

#### Completely automated system

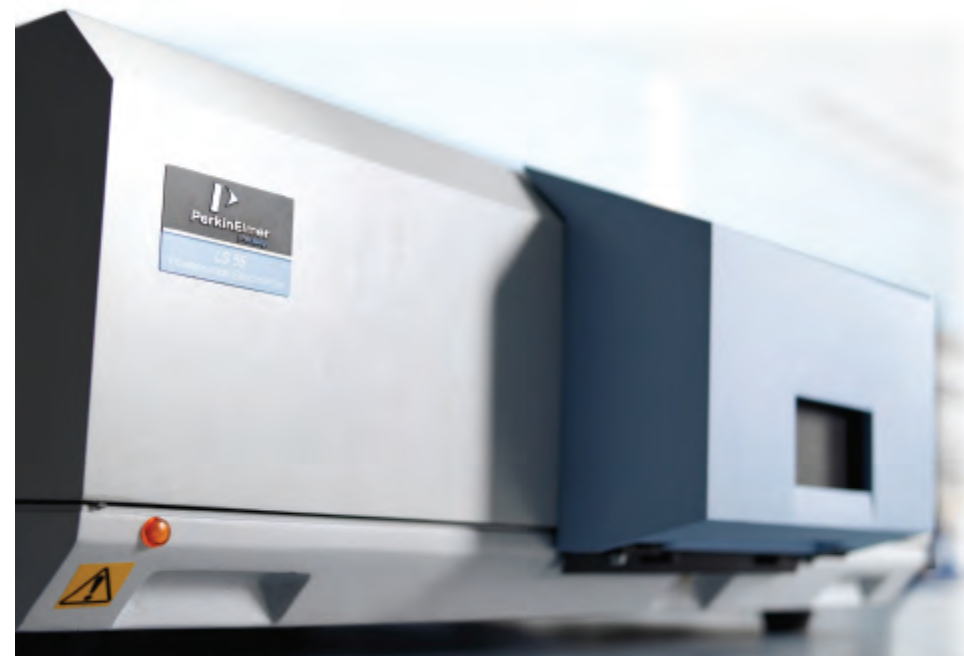
Read up to 96 well plates in either the X or Y direction.

#### Greatest range of applications

The excitation light is collected via a fiberoptic bundle that directs light onto the well, requires no alignment, and works over a range of wavelengths.

#### Results in "real time"

Data is saved as an ASCII file that is compatible with most word processing and spreadsheet software packages.



### Increase your application power

The LS-55 and LS-45 reliably meet the challenges of bioscience, industrial, chemical, environmental, pharmaceutical, agricultural, and academic applications. The LS-55 and LS-45 Fluorescence Spectrometers cover any measurement mode or type of data analysis your application requires:

- Fluorescence
- Phosphorescence
- Bioluminescence
- Chemiluminescence
- 3D excitation/emission, synchronous, and kinetic scanning
- Excitation, emission, constant wavelength synchronous and constant energy synchronous spectral scanning
- Single- and multiple-wavelength kinetics
- Simple quantitation by curve fitting with several fit algorithms
- Intracellular ion analysis
- Polarization

Call 1 800-762-4000 (Toll free U.S.) or +1 203-925-4602 for a **FREE CONSULTATION** with a PerkinElmer LS-55 and LS-45 specialist.

e-mail us: [ProductInfo@perkinelmer.com](mailto:ProductInfo@perkinelmer.com) or go to [www.perkinelmer.com/fluorescence](http://www.perkinelmer.com/fluorescence)

## Fluorescence Spectroscopy Facts

For bioresearch applications involving analysis of minute quantities of material, few other techniques offer as much sensitivity and selectivity at such a moderate cost.

### Consider these key advantages:

**Extraordinary sensitivity:** Fluorescence spectroscopy detects concentrations as low as one part per trillion. This is 10,000 times more sensitive than absorption spectroscopy. Because luminescence is measured directly, a small emission can be amplified many times with little noise.

**Unprecedented selectivity:** Scanning fluorescence spectrometers make use of two selectable wavelengths (excitation and emission) for unmatched selectivity and multi-dimensional information.

**Environmentally sensitive:** Electronic transitions measured in fluorescence spectroscopy are longer-lived than those measured in absorption spectroscopy. They also are sensitive to local polarity, pH, viscosity, and thermal effects.

**Broad-based applications capabilities:** Fluorescence instruments have a six- to seven-fold greater linear measurement range for quantitative analysis than spectrophotometers – with little error at the extremes.

**Safety:** Using fluorescent tags instead of radioisotopes simplifies laboratory safety procedures.



# The LS-55 and LS-45 Fluorescence Spectrometers: the industry standard for bioscience/pharmaceutical applications

## Academic

Cell biology, cellular toxicity/viability, molecular toxicity, protein folding/unfolding, receptor binding studies, teaching (simple assays, DNS, and protein quantification), research (assay development, cell-based work), apoptosis studies, and phagocytosis/oxidative processes

## Agricultural

Pesticide tracing, resistance assays, chlorophyll determinations, crop protection, genetic modification, and plant genetics

## Cell biology

Cytotoxicity, cell studies (viability, quantification, proliferation, adhesion), reporter gene, and apoptosis

## Clinical

Assays (enzyme, substrate, toxicity), porphyrins, steroids, vitamin, and amine studies

## Environmental

Pesticide detection, ground water tracing, oil contamination of water, chlorophyll determination of toxic algae, exhaust gas composition, water purity, uranium and aluminum determination, and biomass

## Enzymology

Protease assays, inhibition studies, surfactant studies, and kinetic assays

## Immunology

Fluorescent enzyme-linked immunosorbent assays, cell proliferation/activation, and tumor necrosis factor

## Industrial

Crack tracing (aerospace), security inks, coding phosphors, brightening/whitening reagents, ultraviolet stabilizers and plasticizers, crude oil fingerprinting, and postage stamp marking

## Inorganic

Aluminum, lead, magnesium, manganese, selenium, zinc, and tin

## Medical

Enzyme/substrate assays, cellular analysis, including bioluminescence and cell proliferation/activation, immunology assays (tumor necrosis factor and enzyme-linked immunosorbent (ELISA) assay

## Molecular biology

DNA and mRNA quantification, gene expression, polymerase chain reaction product quantitation, protein quantitation and folding/unfolding, enzyme activity, porphyrin induction assays, and high throughput drug screening

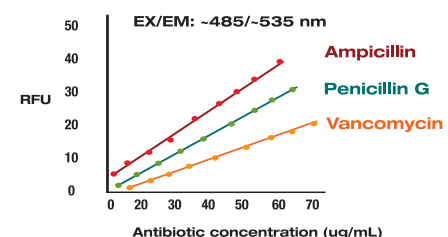
## Pharmaceutical

Vitamins, biogenic amines, drugs, substance abuse, gene expression and discovery, novel drug delivery systems, combinatorial drug discovery, membrane structure studies, toxicity assays, and cell function assays

# Answering the demands of diverse applications

## Cell Viability

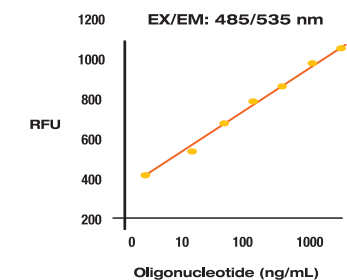
The LS-55 can be used to measure cell viability with excellent sensitivity. In this example, the signal from the SYTOX Green nucleic acid stain is proportional to the number of cells that have lost membrane integrity.



A schematic representation of sensitivity of *E. coli* bacteria to various antibiotics at different antibiotic concentrations using SYTOX Green dye

## Nucleic Acid Quantitation

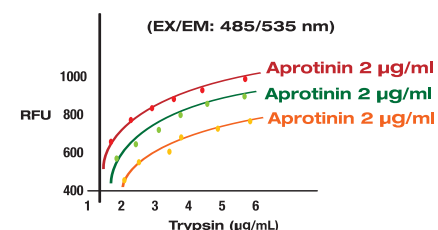
Quantitation of nucleic acid is a routine but essential technique employed by many laboratories. Shown here is the OliGreen assay, which is rapid, sensitive and accurate, with minimal interference from short oligonucleotides, salts and detergents.



Schematic representation of OliGreen reaction

## Enzymology

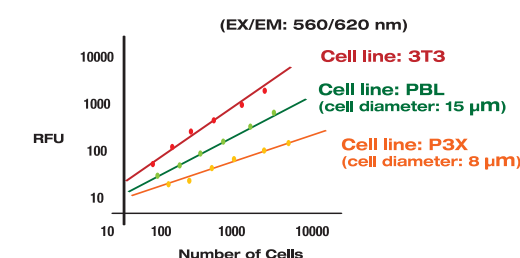
Excellent temperature control and the ability to measure simultaneous reactions make the LS-55 an ideal tool for enzyme studies, such as monitoring the hydrolysis of labeled casein by trypsin and its inhibition by Aprotinin.



Inhibition studies with Trypsin protease inhibitor, Aprotinin Schematic representation of the EnzCheck reaction

## Protein Quantitation

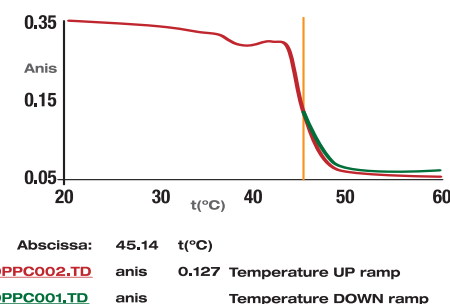
The anionic dye sulforhodamine 101 measures total protein by forming complexes with basic amino acid residues. The LS-55 is the perfect choice for using this technique to detect changes in cell size or population over a range of 100 to more than 100,000 cells.



Schematic representation of sulforhodamine 101 reaction

## Membrane Structure

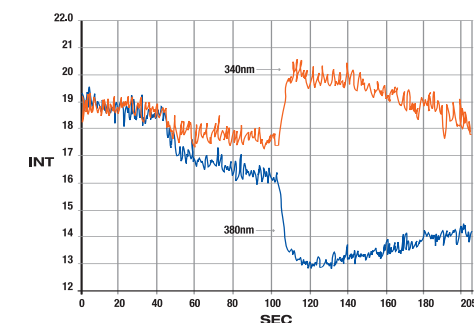
The advanced automated polarization capabilities of the LS-55 allow studies such as this example of cell membrane fluidity. A fluorescent membrane dye, along with the AutoPole software module and a programmable water bath, was used to measure anisotropy as a function of temperature.



Abscissa: 45.14 t(°C)  
 DPPC002.TD anis 0.127 Temperature UP ramp  
 DPPC001.TD anis Temperature DOWN ramp

## Intracellular Biochemistry






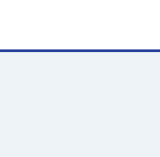

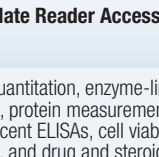



Non-destructive determinations of intracellular calcium are carried out in living cells by binding with a fluorescent dye. In the presence of a cellular stimulus the LS-55's fast-filter accessory measures the relative amounts of the free (380 nm) and bound (340 nm) dyes in real-time.



# The LS-55 and LS-45 Fluorescence Spectrometers feature an entire spectrum of accessories

INSTRUMENT COMPATIBILITY  
● LS-55 ● LS-45

Whether your sample is liquid or solid, abundant or limited, there's an accessory that gets the job done. And, since all accessories are front mounted and easily accessible, you can change sampling modes in an instant.

|  |  |  |   |   |
|--|--|--|---|---|
| <p><b>APPLICATION:</b></p> <p><b>FEATURES:</b></p> |   |   |   |    |
|  | <p><b>Single-Cell Peltier Accessory</b><br/> <span style="color: blue;">●</span> <span style="color: orange;">●</span></p> <p>Temperature ramping studies and measuring thermal denaturation of proteins. All liquid analyses where thermostating is required.</p> <ul style="list-style-type: none"> <li>Single-cell, water-cooled Peltier accessory (operation 0° to 100° C at a resolution of 0.1°)</li> <li>Rapid heating and cooling</li> <li>In-cuvette stirring</li> <li>Control via temperature controller keypad or software</li> </ul> | <p><b>Four-Position and Single-Position Thermostatted Cell Holder</b><br/> <span style="color: blue;">●</span> <span style="color: orange;">●</span></p> <p>Simple, water-cooled cuvette holders are suitable for all liquid analyses.</p> <ul style="list-style-type: none"> <li>Controls sample temperature for accurate data collection</li> <li>Cell holder accommodates one or four 10 mm pathlength cells as well as micro-cuvettes</li> <li>Requires a water bath for circulation around the cells</li> </ul> | <p><b>Front Surface Accessory</b><br/> <span style="color: blue;">●</span> <span style="color: orange;">●</span></p> <p>Analysis of film, paper, powder, fabric, plastic film, and other flat samples.</p> <ul style="list-style-type: none"> <li>Used for fluorescence and phosphorescence measurements</li> <li>Sample can be placed in the accessory directly or held in the synthetic fused silica window powder holder</li> <li>Ultra small volumes or viscous samples can be sandwiched between the two windows</li> <li>Opaque and turbid samples can be measured in small cuvettes (under 10 mm)</li> </ul> | <p><b>AS93plus Autosampler Accessory</b><br/> <span style="color: blue;">●</span></p> <p>High throughput sampling of liquids; highly sensitive alternative to microplate reading.</p> <ul style="list-style-type: none"> <li>Can measure up to 200 samples in a single rack</li> <li>Software-controlled peristaltic pump allows collection of intensity, polarization or anisotropy measurements</li> </ul>  |
| <p><b>APPLICATION:</b></p> <p><b>FEATURES:</b></p> |    |   |   |    |
|  | <p><b>Total Emission Accessory</b><br/> <span style="color: blue;">●</span> <span style="color: orange;">●</span></p> <p>Samples with weak emission (enhances the sensitivity of the fluorescence collection).</p> <ul style="list-style-type: none"> <li>Recommended for bioluminescence and chemiluminescence measurements</li> </ul>  | <p><b>Remote Fiberoptic Accessory</b><br/> <span style="color: blue;">●</span> <span style="color: orange;">●</span></p> <p>Remote, non-destructive testing of fluorescent papers and fabrics or remote sampling of hazardous materials.</p> <ul style="list-style-type: none"> <li>For taking the measurement to the sample</li> </ul>  | <p><b>LC Flow Cell Accessory</b><br/> <span style="color: blue;">●</span> <span style="color: orange;">●</span></p> <p>High-sensitivity liquid chromatography; alternative to a dedicated LC fluorescence detector.</p> <ul style="list-style-type: none"> <li>Works with the monochromators of the LS-55 and LS-45 for optimal sensitivity and specificity</li> </ul>  | <p><b>Well-Plate Reader Accessory</b><br/> <span style="color: blue;">●</span></p> <p>DNA quantitation, enzyme-linked assays, protein measurements, fluorescent ELISAs, cell viability testing, and drug and steroid testing.</p> <ul style="list-style-type: none"> <li>Measures in fluorescence, phosphorescence, bioluminescence and chemiluminescence modes</li> <li>Fiberoptic light feed for permanent alignment and high performance</li> <li>Uses wide range of UV and visible wavelengths</li> <li>Software allows scanning of flat samples; presents data as a 3D image</li> <li>Standard or far-UV fiberoptics</li> <li>Easily removes and installs for switching between plate and cuvette measurements</li> <li>Can create programs for single end-point and kinetics analyses</li> <li>Optional plug-in software module allows the user to collect multiple spectra per well</li> <li>Measures in up to 96 well plates</li> </ul> |
| <p><b>APPLICATION:</b></p> <p><b>FEATURES:</b></p> |   |   |   |   |
|  | <p><b>Biokinetics Accessory</b><br/> <span style="color: blue;">●</span></p> <p>Polarization/anisotropy work, protein folding/unfolding and DNA melting.</p> <ul style="list-style-type: none"> <li>Single position magnetically stirred sample holder with event marking and temperature sensor that measures from 0° to 100° C</li> </ul>  | <p><b>Fast Filter Accessory</b><br/> <span style="color: blue;">●</span></p> <p>Rapid data collection during biochemical processes (i.e., intracellular ion collection).</p> <ul style="list-style-type: none"> <li>Pairs of optical filters obtain ratio measurements every 40 milliseconds</li> <li>Two pairs of filters can be fitted on each wheel</li> <li>Ratio data or individual intensities can be viewed in real-time</li> </ul>   | <p><b>Sipper Accessory</b><br/> <span style="color: blue;">●</span></p> <p>Automation of routine analysis and quantitation and rapid liquid sampling.</p> <ul style="list-style-type: none"> <li>Automatically transfers sample from vessel to cuvette</li> <li>Minimizes handling of quartz cuvettes</li> <li>Includes software-controlled peristaltic pump and 16 µL volume flowcell</li> </ul>   |   |

The LS-55 also includes an automated Polarizer that consists of two filter wheels, each containing a horizontal and vertical polarizing element. Polarizer positions are software controlled and can be manually set or automatically controlled for polarization, anisotropy, or G-factor.

## Relax... FL WinLab software is reliable and user friendly

The FL WinLab software is user friendly and application specific, seamlessly combining PerkinElmer's extensive application-specific knowledge and instrument control. The FL WinLab software is easy to configure for the applications you need.

Access specific modes of instrument operation – Scan, Time Drive, and Ratio Data Collection – directly from the Applications Menu. You can scan the excitation and emission monochromators either independently or synchronously.

FL WinLab software includes a validation protocol that automatically checks instrument performance. This ensures reliable data and helps your laboratory comply with good laboratory practice (GLP).

Additionally, PerkinElmer offers a range of plug-in application modules offering further research capabilities. These include:

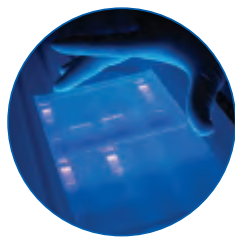
- Short phosphorescence decay routine
- Enzyme-activity program
- WPR Scan – allowing the Well-Plate Reader to scan multiple spectra per well
- Autopol – for programmed measurement of intensity, polarization, or anisotropy vs. temperature
- A variety of advanced three-dimensional data-handling, presentation, and export routines



**PerkinElmer Fluorescence Spectrometers are backed by the best support team in the industry.**  
 Go to [www.perkinelmer.com/fluorescence](http://www.perkinelmer.com/fluorescence) to learn more.

Call **1 800-762-4000** (Toll free U.S.) or **+1 203-925-4602** for a **FREE CONSULTATION** with a PerkinElmer LS-55 and LS-45 specialist, and ask for an instrument and software demonstration.





## LS-55 and LS-45 Fluorescence Spectrometers from PerkinElmer – **the flexibility you need, from the manufacturer you trust**

### **A perfect blend of sturdy dependability and high performance**

PerkinElmer, Inc. is a global technology leader focused in Life and Analytical Sciences and Optoelectronics. A \$1 billion market leader, the Life and Analytical Sciences division serves a large number of industries, including academic research, biotechnology, clinical screening, pharmaceutical, environmental, forensic, and the petrochemical and semiconductor segments.

Our instruments, related software, and customer support programs – including our team of over 1,000 factory-trained service professionals deployed in over 125 countries – help our customers to enhance research productivity, meet strict regulatory requirements, improve time-to-market, and increase manufacturing efficiencies.

The LS-55 and LS-45 Fluorescence Spectrometers are the preferred instruments for laboratories worldwide.

### **The PerkinElmer Fluorescence Spectrometer Advantage**

#### CONSIDER THESE BENEFITS:

- Wide range of applications
- Huge range of accessories
- Pulsed Xenon lamp reduces photobleaching of samples
- Large convenient sample compartment
- User-friendly FL WinLab software
- The LS-55 is highly sensitive and flexible, and is ideal for research applications; it has holographic gratings to reduce stray light, as well as automated polarizers
- The LS-45 is a sturdy workhorse, well-suited for accurate and reproducible routine analyses
- Choose from variable (LS-55) or fixed (LS-45) slits
- Based on decades of experience with fluorescence spectroscopy

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